

Fine Dust in Augmented Reality: Creating Public Service Announcement

Eugene Kim¹ & Jaewon Choi²

¹Korea National University of Arts, Seoul, Korea

²Orange Sky Research Center, Seoul, Korea

Abstract: This study discusses how to create a public service announcement about fine dust using AR technology. ‘Aurasma,’ a free mobile app, was used to produce the PSA. The PSA mainly consists of four parts, a trigger image, a short animation, an interactive menu, and other media which provide additional information about fine dust as users press the menu buttons. This study also surveys the user’s preference on a PSA using AR technology and its educational effectiveness.

Keywords: augmented reality; fine dust; trigger images; overlays; public service announcement;

I. INTRODUCTION

Augmented Reality (AR) has been a trending issue in many areas, including marketing, education, and entertainment, in recent years. AR is the combination of real-world objects and virtual-world information in real-time. It contributes to an improvement in the way information is delivered and received when compared to paper-based media such as a static image and text. Thus, many industries, including automobile manufacturers, have been using AR technology as their new advertising strategy [1]. A number of educators have also been adopting AR methods in their classrooms. The purpose of employing this technology in marketing and education is to cause the viewer to remember pertinent details related to the information provided. Unlike traditional print advertisements and textbooks, AR technology allows the viewer to manually control a virtual enhancement of the real-world information. The result is a more interactive experience, which may lead the viewer perception to be improved and enriched. AR technology can be a very useful tool for creating public service announcements (PSAs) as well. This study presents an augmented reality public service announcement about fine dust. In addition, this study surveys user’s preference on a PSA using AR technology and its effectiveness.

II. MOTIVATION

One of the most powerful strengths of AR technology is that Augmented Reality makes explicit the implicit. This means that implicit information related to a certain context becomes usable and directly accessible through the AR interface [2]. Recently, the use of AR technology has dramatically increased, with a significant impact on society and human activities. Some educators have employed AR to

bring curriculum in the classroom to life. Many museums have used AR to provide visitors with more pleasant, interactive experiences. AR technology has even transformed the way consumers interact with products. For example, online shoppers can virtually “try on” wearable goods by means of AR before they make purchases.

In conjunction with the development of mobile device technology, a variety of AR apps for the mobile device lets viewers see ‘augmented’ images or other enhancements of their real world environments directly on the screen of their mobile devices.

Such mobile AR technology can be a very effective strategy for creating PSAs as well. Users can get PSAs when viewing signs or pictures. They can obtain helpful and real-time alarms, warnings, and instructions when selecting a location on their mobile device. They may be notified of missing children through amber alerts [3].

The main purpose of a PSA is to educate the audience and promote a behavioral change. AR technology can provide people with more important and dramatic information about a problem or issue than possible through traditional paper or video format PSAs. Moreover, it allows people to interact with their real environments. Utilizing AR technology can be a new way of creating a better PSA.

III. AUGMENTED REALITY IN THE PUBLIC SERVICE ANNOUNCEMENT

A. Fine Dust

This project addresses the dangers of fine dust and its harmful impact on our lives. Fine particles are defined as

particles smaller than 2.5 micrometer in aerodynamic diameter ($PM_{2.5}$) and have critical effects on human health. It is well known that people exposed to fine dust over a long period of time have higher rates of heart and lung diseases. These days, air pollution is getting worse and presents a significant danger to people in many cities worldwide, especially in China, Korea, and Japan. It is not surprising that young children in those cities sometimes chose gray colors to represent the sky. This project attempts to educate people about the harm fine dust presents and what to do in order to reduce the level of these particles in order to save the earth.

B. Method

Mobile Augmented Reality allows the real-time blending of real-world objects with digital information, such as 3D models, still images, video clips, and web pages. Real-world objects can trigger viewers to the augmented world through an AR app on their phone. For this project, ‘Aurasma,’ a free mobile app, was used to create the PSA.

Aurasma allows users to generate or view augmented reality worlds. By simply pointing the viewfinder of a mobile device at an object or photo called the “trigger” or “trigger image,” user can access an interactive experience called “Aura” that transforms the trigger image into a video, animation, another image, 3D object or a web page called “Overlay.” The auras can be saved as either public or private and added to a specific channel in Aurasma's Studio to be shared with other users. Aurasma gives users the opportunity to easily enhance content by incorporating various media, including videos, photographs, and animations, to attract their audience [4].

C. Implementation

The PSA consists of four parts, as displayed in Figure 1. After the trigger image presents an introductory animation, the interactive menu allows the viewer to choose from three images and a website click-through [5].

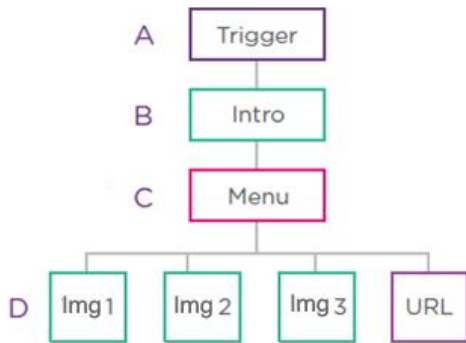


Figure 1. Structure of the AR PSA

Figure 2 shows the trigger image, a fine dust advisory issued in Seoul, Korea, which warns that people who are old and weak should stay inside.

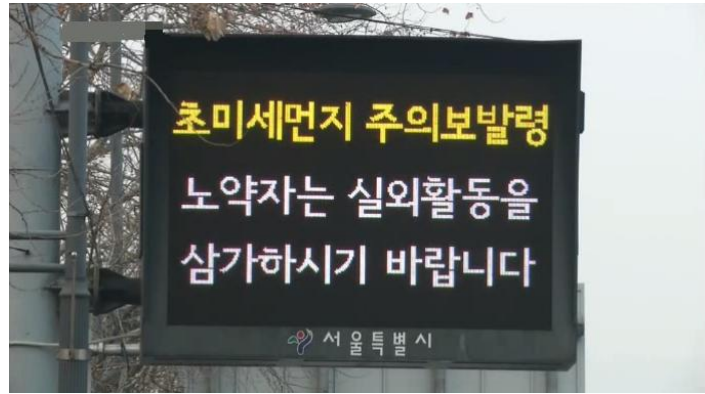


Figure 2. Trigger image of fine dust

AR technology adds an animation to this trigger image. The first part of the animation shows a beautiful city getting choked by the heavy smog that results from factory fumes. Figures 3 and 4 exhibit some still images from this part of the animation.



Figure 3. Factory fumes in the city



Figure 4. Heavy smog covering the city

The second part of the animation shows a little girl who is exposed to secondhand smoke, exhaust emissions, and fine dust on a city street, as shown in Figures 5 and 6.



Figure 5. A girl on the street in a city with heavy smog



Figure 6. A girl exposed to exhaust emissions

In addition, the last part of the animation depicts how the little girl's lungs are affected by the air pollution in the city. Figures 7 and 8 depict the girl's lung damage over the time.



Figure 7. The girl's healthy lungs



Figure 8. Damaged lungs after exposure to fine dust

After the animation is played, the five-button menu is displayed, as shown in Figure 9.

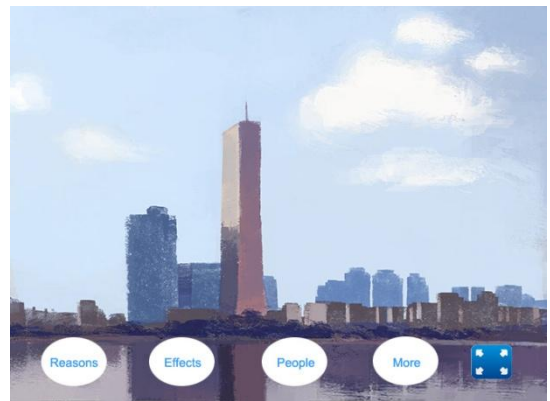


Figure 9. The menu

The menu is included to provide the viewer with more interactive controls on AR materials. When selected, the 'Reasons' button opens images that illustrate the causes of fine dust. The 'Effects' button launches images that explain how human white blood cells are affected by air pollution. The 'People' button displays images that demonstrate how fine dust has transformed the patterns of people's everyday activities. The 'More' button opens a website about fine dust so the viewer may access more detailed information. The rightmost button makes the main menu expand to full screen when tapped.

IV. RESULTS AND DISCUSSIONS

Unlike advertisements and other types of PSAs, environmental PSAs are presented with the idea that the viewer will respond with an appropriate behavioral change. Therefore, just attending to PSAs is not enough. An environmental PSA must be memorable and motivate the audience to change behavior [6]. This study includes a simple survey with two primary questions. First, which type of a PSA is preferable? A video PSA – consisting of only the intro animation - or an interactive PSA that incorporates AR technology - the trigger, the intro animation, the menu and its overlays? Second, which type of a PSA is more helpful to learn and remember the content? Ten people participated in the survey, and each subject's responses

were collected independently. Sixty percent of subjects preferred the interactive PSA. In addition, all of them agreed that the latter was more helpful in terms of learning and remembering the issue later, despite the fact that 40% of subjects preferred the former.

V. CONCLUSION

The results show that an interactive PSA using AR technology can satisfy the main purpose of a PSA that seeks to educate the audience and promote a behavioral change. That is, AR technology provides the viewer with more interactive and deeper learning experiences. Moreover, AR technology can provide students with opportunities to think critically and carefully about the content as they decide what overlays and triggers to use in creating their own PSA in the classroom.

VI. REFERENCES

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